

ABSTRACT

IMAGE PROCESSING APPARATUS

5 In an apparatus and method for creating a computer
representation of a three-dimensional surface of an
object, the viewing cones for the camera positions at
which images of the object were taken are determined and
the intersection of these viewing cones is used to define
10 an initial three-dimensional space within which the
object surface lies. This initial space is divided into
voxels and each non-occluded voxel is checked for
photoconsistency by comparing the colours (or average
colours) of the pixel patches in the various images to
15 which that voxel can be projected. Any voxels which are
photo-inconsistent are removed. A voxel may be
determined to be photo-inconsistent if the average
colours of the pixel patches are different. Where the
average colours of the pixel patches are different,
20 further processing may be carried out before a voxel is
discarded. Thus, such a voxel may be divided into
subsidiary voxels each of which is projected into a pixel
region in each of the images and the voxel only removed
if there exists no set of pixel regions consisting of a
25 pixel region taken from each image which is

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photoconsistent. In an alternative, the pixels of the pixel patches are each allocated to a specific one of a number of colour value ranges and a voxel is only determined to be photo-inconsistent if the pixel patches do not share at least one colour value range. The steps of projecting the voxels into the images and removing photo-inconsistent voxels are repeated until all non-occluded voxels are photoconsistent, thereby generating a three-dimensional computer representation of the three-dimensional object surface. The resulting voxel space may be stored together with the colour of each non-occluded voxel and the colour of the pixel patch into which each voxel projects in a further image compared with the stored colour for that voxel and any photo-inconsistent voxels removed. This process can then be repeated for a succession of further images. In another arrangement each further image may be compared with a sub-set of the first set to determine the photoconsistency of the voxels.

(Fig. 4)